

# COMS W4170

## UI Design Principles 2

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## Levels of Training/Documentation

Google past (2006)

A screenshot of the Google search interface from 2006. The search bar contains the text "novice expert". To the right of the search bar is a "Search" button and links for "Advanced Search" and "Preferences". Below the search bar, the text "Web" is on the left, and "Results 1 - 10 of about 2,660,000 for novice expert (0.08 seconds)" is on the right. A link "New! View and manage your web history" is also visible.

Simple search

A screenshot of the Google search interface from 2006, showing an opportunistic suggestion. The search bar contains the text "novice or expert". Below the search bar, the text "Web" is on the left, and "Results 1 - 10 of about 2,330,000 for novice or expert (0.10 seconds)" is on the right. A link "New! View and manage your web history" is also visible. A message "Try uppercase 'OR' to search for either of two terms. [details]" is displayed above the results.

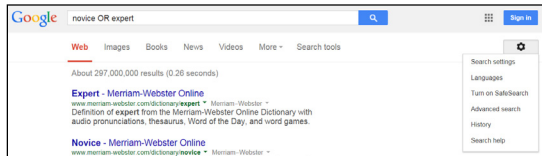
Opportunistic suggestion to use advanced feature

A screenshot of the Google search interface from 2006, showing documentation for the "OR" search feature. The search bar contains the text "vacation london OR paris". To the right of the search bar is a "Google Search" button. The text "To find pages that include either of two search terms, add an uppercase OR between the terms." is displayed above the search bar. Below this text, the text "For example, here's how to search for a vacation in either London or Paris:" is displayed.

Documentation of advanced feature

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# Levels of Training/Documentation



Google 2014

Search help and advanced search are in pull-down menu

**Search for either word**

**OR**

If you want to search for pages that may have just one of several words, include **OR** (capitalized) between the words. Without the **OR**, your results would typically show only pages that match both terms.

**world cup location 2014 OR 2018**

Search help: Several levels of indirection are needed to learn about "OR"

Find pages with...

all these words:

this exact word or phrase:

any of these words:

To do this in the search box

Type the important words: tricolor rat terrier

Put exact words in quotes: "rat terrier"

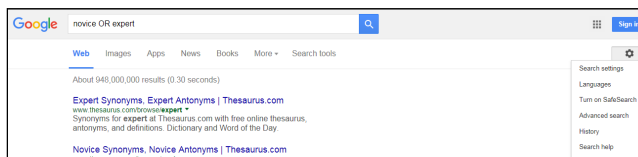
Type OR between all the words you want: miniature OR standard

Advanced search: Documentation of "OR"

Type OR between all the words you want: miniature OR standard

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# Levels of Training/Documentation



Google 2015-2016

Search help and advanced search are in pull-down menu

**OR**

Find pages that might use one of several words.

Example: **marathon OR race**

Search help: Several levels of indirection are needed to learn about "OR"

Find pages with...

all these words:

this exact word or phrase:

any of these words:

none of these words:

numbers ranging from:  to

To do this in the search box

Type the important words: tricolor rat terrier

Put exact words in quotes: "rat terrier"

Type OR between all the words you want: miniature OR standard

Put a minus sign just before words you don't want: -quadrant -"Back Street"

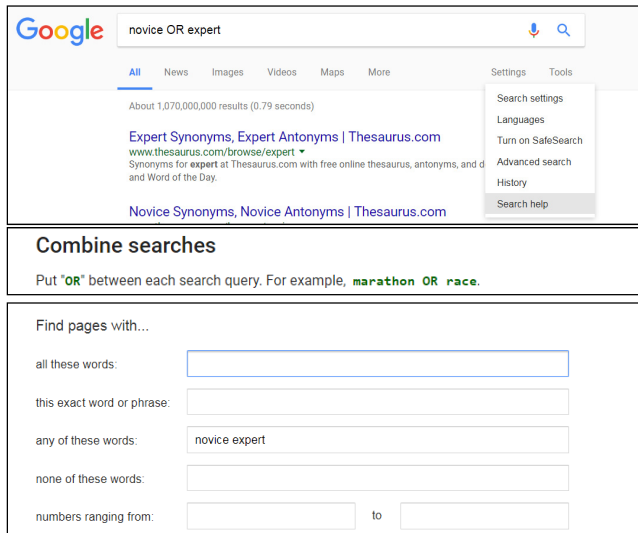
Put 2 periods in phrase: ...

Advanced search: Documentation of "OR"

Type OR between all the words you want: miniature OR standard

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## Levels of Training/Documentation



Google search results for "novice OR expert". The search bar shows "novice OR expert" and the results show "About 1,070,000,000 results (0.79 seconds)". The first result is "Expert Synonyms, Expert Antonyms | Thesaurus.com". Below the search results, there is a section titled "Combine searches" with the text "Put 'OR' between each search query. For example, **marathon OR race**." Below this, there is a section titled "Find pages with..." with several input fields for search criteria: "all these words:", "this exact word or phrase:", "any of these words:" (with "novice expert" entered), "none of these words:", and "numbers ranging from:".

Google 2017–2018

Search help and advanced search are in pull-down menu

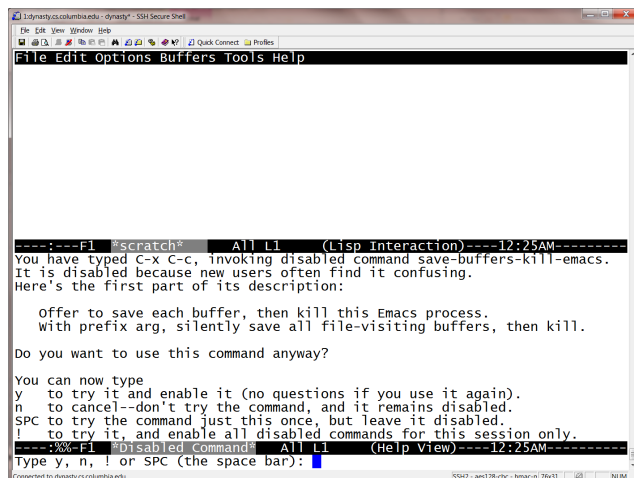
Search help: Several levels of indirection are needed to learn about "OR"

Advanced search: Documentation of "OR" won't appear if window and text size are too small

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## Levels of UI Functionality

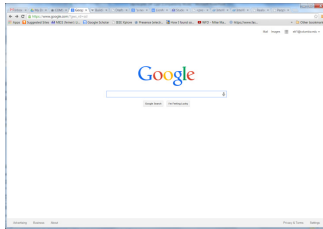
Selective enabling of operations



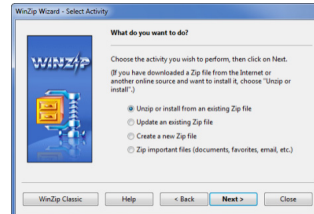
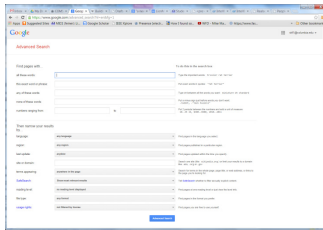
Terminal window showing Emacs output. The message reads: "You have typed C-x C-c, invoking disabled command save-buffers-kill-emacs. It is disabled because new users often find it confusing. Here's the first part of its description: offer to save each buffer, then kill this Emacs process. With prefix arg, silently save all file-visiting buffers, then kill. Do you want to use this command anyway? You can now type y to try it and enable it (no questions if you use it again). n to cancel--don't try the command, and it remains disabled. SPC to try the command just this once, but leave it disabled. ! to try it, and enable all disabled commands for this session only. Type y, n, ! or SPC (the space bar):".

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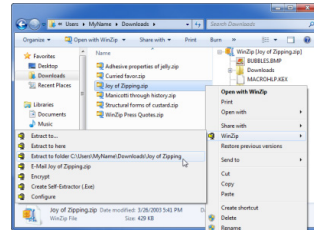
# Levels of UI Functionality



Simple vs. advanced UI



Wizard vs. regular UI



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## Identify the Tasks

- “Common tasks should be easy. Uncommon tasks should be possible.”

— ?

- Determine mapping to lexical level based on frequency of use:

- Special keys
- Modifier key combinations
- Top-level menu item/icon
- Menu navigation/form fill-in

Most frequent



Least frequent

What's wrong with this approach?

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## Determine the Interaction Styles

- Command language
- Form fill-in
- Menu selection
- Direct manipulation
- “Natural” interaction
  - Speech
  - Touch, Gesture: 2D, 3D, multitouch,...
  - Body sensing

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## Determine the Interaction Styles

An example of progression toward more direct manipulation: less recall/more recognition, fewer keystrokes/fewer clicks, less capability to make errors, and more visible context.

>MONTH/08;DAY/21

a. Command line

MM/DD 08/21

b. Form fill-in to reduce typing

MM 08 DD 21

c. Improved form fill-in to clarify and reduce errors

JAN	Month	Day 21 ▼
FEB		
MAR		
APR		
MAY		
JUN		
JUL		
AUG		
SEP		
OCT		
NOV		
DEC		

d. Pull-down menus offer meaningful names and eliminate invalid values

August						
S	M	T	W	T	F	S
	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

e. 2-D menus to provide context, show valid dates, and enable rapid single selection

Box 3.2: Spectrum of directness, Shneiderman et al., *DTUI*

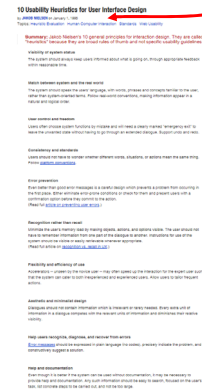
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# Ten Usability Heuristics J. Nielsen

<https://www.nngroup.com/articles/ten-usability-heuristics/>

JAKOB NIELSEN on January 1, 1995

- Visibility of system status
- Match between system and the real world
- User control and freedom
- Consistency and standards
- Error prevention
- Recognition rather than recall
- Flexibility and efficiency of use
- Aesthetic and minimalist design
- Help users recognize, diagnose, and recover from errors
- Help and documentation



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# Ten Usability Heuristics J. Nielsen

<https://www.nngroup.com/articles/ten-usability-heuristics/>

## Visibility of system status

The system should always keep users informed about what is going on, through appropriate feedback within reasonable time.

## Match between system and the real world

The system should speak the users' language, with words, phrases and concepts familiar to the user, rather than system-oriented terms. Follow real-world conventions, making information appear in a natural and logical order.

## User control and freedom

Users often choose system functions by mistake and will need a clearly marked "emergency exit" to leave the unwanted state without having to go through an extended dialogue. Support undo and redo.

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## *Ten Usability Heuristics J. Nielsen*

<https://www.nngroup.com/articles/ten-usability-heuristics/>

### **Consistency and standards**

Users should not have to wonder whether different words, situations, or actions mean the same thing. Follow platform conventions.

### **Error prevention**

Even better than good error messages is a careful design which prevents a problem from occurring in the first place. Either eliminate error-prone conditions or check for them and present users with a confirmation option before they commit to the action.

### **Recognition rather than recall**

Minimize the user's memory load by making objects, actions, and options visible. The user should not have to remember information from one part of the dialogue to another. Instructions for use of the system should be visible or easily retrievable whenever appropriate.

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## *Ten Usability Heuristics J. Nielsen*

<https://www.nngroup.com/articles/ten-usability-heuristics/>

### **Flexibility and efficiency of use**

Accelerators -- unseen by the novice user -- may often speed up the interaction for the expert user such that the system can cater to both inexperienced and experienced users. Allow users to tailor frequent actions.

### **Aesthetic and minimalist design**

Dialogues should not contain information which is irrelevant or rarely needed. Every extra unit of information in a dialogue competes with the relevant units of information and diminishes their relative visibility.

### **Help users recognize, diagnose, and recover from errors**

Error messages should be expressed in plain language (no codes), precisely indicate the problem, and constructively suggest a solution.

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<https://www.nngroup.com/articles/ten-usability-heuristics/>

Even though it is better if the system can be used without documentation, it may be necessary to provide help and documentation. Any such information should be easy to search, focused on the user's task, list concrete steps to be carried out, and not be too large.

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## Golden Rules of UI Design:

### 1. Consistency

```
rmail_____ = feiner@cs.columbia.edu
inpLibrary_____ = Science & Engineering
inpSubmitterUNI_____ = skf1
inpSubmitterEmail_____ = feiner@cs.columbia.edu
inpSubmitterName_____ = Steve Feiner
optSubmitterType_____ = Instructor
inpInstructorName_____ =
inpInstructorEmail_____ =
inpCourseName_____ = User Interface Design
selSemesterName_____ = Fall
selSemesterYear_____ = 2014
selCoursePrefix_____ = W
inpCourseNum_____ = 4170
inpSectionNum_____ = 01
inpExpectedEnrollment_____ = 80
inpReactivateList_____ = true
texCitations_____ =

The preceding message was sent by a Web user on Tue Sep 02 03:51:10 2014
```

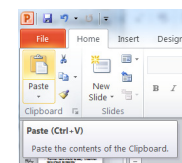
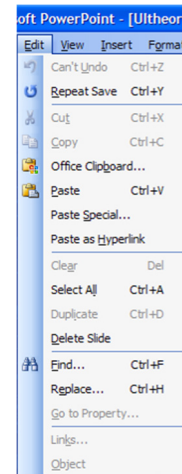
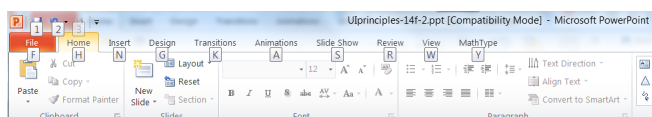
- Confirmation received when requesting the CU libraries to order a book for reserve, 2014

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## Golden Rules of UI Design:

### 2. Universal Usability

- Diversity, diversity, diversity
  - Experience, ability, technology,...
- E.g., support for shortcuts
  - Increase speed for frequent users/cmds
  - Accommodate/encourage increasing expertise
    - Abbreviations, key accelerators
    - Macro facilities



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## Golden Rules of UI Design: 2. Universal Usability

### ■ Accessibility

Analysis

Magnifier

Check for Issues

Check for Issues

Inspect Document

Check Accessibility

Check Compatibility

UI modification

Make your computer easier to use

Quick access to common tools

You can use the tools in this section to help you get started. Windows can read and scan this list automatically. Press the SPACEBAR to select the highlighted tool.

☒ Always read this section aloud ☒ Always scan this section

Start Magnifier Start Narrator

Start On-Screen Keyboard Set up High Contrast

Not sure where to start? Get recommendations to make your computer easier to use

Explore all settings

When you select these settings, they will automatically start each time you log on.

- Use the computer without a display  
Optimize for blindness
- Make the computer easier to see  
Optimize visual display
- Use the computer without a mouse or keyboard  
Set up alternative input devices
- Make the mouse easier to use  
Adjust settings for the mouse or other pointing devices
- Make the keyboard easier to use  
Adjust settings for the keyboard
- Use text or visual alternatives for sounds  
Set up alternatives for sounds
- Make it easier to focus on tasks  
Adjust settings for reading and typing

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## Golden Rules of UI Design: 3. Feedback

- Minimize the “Gulf of Evaluation”
- Discrete ↔ Continuous Feedback
  - Highlighting selected object
  - Displaying object/cursor tracking finger/mouse

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## Golden Rules of UI Design: 4. Closure

- Group actions to provide frequent “milestones”
  - Give sense of accomplishment when (part of) a task has been finished
  - Minimize feeling of suspense

The screenshot shows the Barnes & Noble checkout page. At the top, there's a banner for a \$25 back on this order. Below that, the 'Shipping Address' section is highlighted. It contains fields for First Name, Last Name, Company Name, Address Line 1, Address Line 2, City, State/Province (a dropdown menu), ZIP/Postal Code, Country (a dropdown menu), and Phone. There are checkboxes for 'Check this box if this address cannot be serviced by UPS' and 'Check this box to use this address as your billing address'. Below the shipping address section, there's a 'Continue Checkout' button. To the right of the shipping address section, there's a sidebar with a 'Bag Summary' showing 'Product Total' and 'Order Total', and a 'Get FREE Sign up for Limit' offer. At the bottom of the page, there's a navigation bar with links for 'Shipping Options & Gift Preferences', 'Payment', 'Create Account (optional)', and 'Order Review'.

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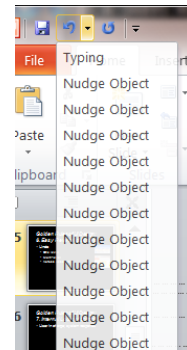
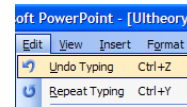
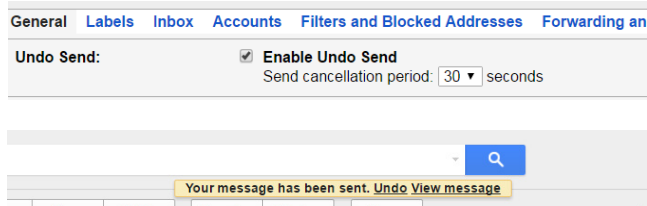
## Golden Rules of UI Design: 5. Error Prevention/Handling

- Prevent errors
- Minimize consequences

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## Golden Rules of UI Design: 6. Easy Reversal of Actions

- Undo
  - One level
  - Multi-level
  - Across sessions



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## Golden Rules of UI Design: 7. User in Control

- User in charge; system responds



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